

CLAIMS

Therefore, at least the following is claimed:

- 1 1. An apparatus for equalizing a discrete multi-tone (DMT) transmit spectrum,
2 comprising:
3 a DMT transmitter configured to generate a plurality of DMT carrier tones and
4 combine the plurality of carrier tones into a transmit symbol;
5 an amplifier configured to detect the transmit symbol;
6 a discrete Fourier transform (DFT) element configured to separate the transmit
7 symbol into the plurality of carrier tones; and
8 a gain adjustment element configured to adjust each of the plurality of carrier tones
9 based on a predefined transmit signal spectrum.
- 1 2. The apparatus of claim 1, wherein each DMT carrier tone is independently
2 adjusted.
- 1 3. The apparatus of claim 1, wherein the gain adjustment element further
2 comprises:
3 logic configured to measure the power on each of the plurality of carrier tones; and
4 logic configured to provide a gain scalar for each of the plurality of carrier tones.
- 1 4. The apparatus of claim 1, wherein the amplifier monitors local line conditions.

1 5. The apparatus of claim 1, wherein the transmit symbol is generated prior to a
2 start-up sequence.

1 6. The apparatus of claim 1, wherein the transmit symbol is generated after a
2 start-up sequence.

1 7. The apparatus of claim 1, wherein each of the plurality of DMT carrier tones
2 is encoded into a circular signal space constellation.

1 8. The apparatus of claim 1, wherein each of the plurality of DMT carrier tones
2 is encoded into a square signal space constellation.

1 9. A method for equalizing a discrete multi-tone (DMT) transmit spectrum, the
2 method comprising the steps of:
3 generating a plurality of DMT carrier tones;
4 combining the plurality of carrier tones into a transmit symbol;
5 detecting the transmit symbol;
6 separating the transmit symbol into the plurality of carrier tones; and
7 adjusting each of the plurality of carrier tones based on a predefined transmit signal
8 spectrum.

1 10. The method of claim 9, wherein the adjusting step further comprises the steps
2 of:
3 calculating a power level for each of the tones;
4 comparing the power level of each tone with a predetermined power level; and
5 adjusting the power level of each tone to match the predetermined power level.

1 11. The method of claim 9, wherein the adjusting step is performed using gain
2 scalars.

1 12. The method of claim 9, further comprising the step of monitoring a
2 communication line to detect impedance variations, where the adjusting step is responsive to
3 the impedance variations.

1 13. The method of claim 9, further comprising the step of generating the transmit
2 symbol prior to a start-up sequence.

1 14. The method of claim 10, further comprising the step of generating the transmit
2 symbol after a start-up sequence.

1 15. The method of claim 9, further comprising the step of encoding each of the
2 plurality of DMT carrier tones into a circular signal space constellation.

1 16. The method of claim 9, further comprising the step of encoding each of the
2 plurality of DMT carrier tones into a square signal space constellation.

1 17. An apparatus for equalizing a discrete multi-tone (DMT) transmit spectrum,
2 comprising:

3 means for generating a plurality of DMT carrier tones;

4 means for combining the plurality of carrier tones into a transmit symbol;

5 means for detecting the transmit symbol;

6 means for separating the transmit symbol into the plurality of carrier tones; and

7 means for adjusting each of the plurality of carrier tones based on a predefined
8 transmit signal spectrum.

1 18. The apparatus of claim 17, further comprising:

2 means for calculating a power level for each of the tones;

3 means for comparing the power level of each tone with a predetermined power level;

4 and

5 means for adjusting the power level of each tone to match the predetermined power

6 level.

1 19. The apparatus of claim 17, wherein the adjusting means uses gain scalars.

1 20. The apparatus of claim 17, further comprising means for monitoring a
2 communication line to detect impedance variations and where the adjusting means is
3 responsive to the impedance variations.

1 21. The apparatus of claim 17, further comprising means for generating the
2 transmit symbol prior to a start-up sequence.

1 22. The apparatus as defined in claim 17, further comprising means for generating
2 the transmit symbol after a start-up sequence.

1 23. The apparatus of claim 17, further comprising means for encoding each of the
2 plurality of DMT carrier tones into a circular signal space constellation.

1 24. The apparatus of claim 17, further comprising means for encoding each of the
2 plurality of DMT carrier tones into a square signal space constellation.

1 25. An apparatus for equalizing a transmit spectrum of a digital subscriber line
2 (DSL) communication device, comprising:

3 means for generating a transmit symbol;

4 means for detecting the transmit symbol;

5 means for separating the transmit symbol into a plurality of frequencies; and

6 means for adjusting a power level associated with each of the plurality of frequencies
7 based on a predefined transmit signal spectrum.

1 26. The apparatus of claim 25, wherein the communication device is quadrature
2 amplitude modulation (QAM) modulated single carrier.

1 27. The apparatus of claim 25, wherein the communication device is carrierless
2 amplitude/phase (CAP) modulated single carrier.

1 28. The apparatus of claim 25, wherein the means for adjusting a power level
2 associated with each of the plurality of frequencies based on a predefined transmit signal
3 spectrum further comprises a finite impulse response filter.